Marked-up copy of claims Corrections Dec. 05/02.

What is claimed is:

~~1.~~ The multifunctional apparatus for forming ~~to manufacture~~ mineral fibers of a diameter between 7 and 20 microns wherein the apparatus comprises: ~~made of natural rock minerals such as basalts capable of forming fibers to be drawn / attenuated and gathered into a continuous strand, wherein said elemental fibers are produced from 7 μm to 20 μm in diameter having a stable amorphous structural state and exhibit flexible/ductile properties. Wherein different modifications of said apparatus are designed depending on basalt rock composition and glass body properties, comprising the key members:~~

(a) A vertically oriented furnace having a first side, and a second side opposite the first side, wherein said furnace can be oriented horizontally having one side; a ~~vertical or horizontal depending on rock (basalt) minerals properties;~~

(b) a first and second melting chambers, wherein the chambers are at the top of the furnace and wherein the first chamber is positioned at the first side and the second chamber is positioned at the second side;

~~two fore-chamber or two retort members designed for melting of ground rock mineral, wherein said fore-chamber or retort members are positioned opposite each of other at the top of a vertical apparatus. Wherein only one fore-chamber/retort is used for horizontal apparatus comprising one multi-zones horizontal valley ;~~

(c) a first adjustable sloped valley member under the first melting chamber, and a second adjustable slopped valley member under the second melting chamber;

~~a sloped valley (with adjustable angle) member is positioned beneath of each said fore-chamber / retort. Wherein said valley comprises zones with different depths that promotes turbulent flowing that causes glass body volatile elements degasing and melted minerals mixing;~~

(d) a vertical stack of horizontal valley members, wherein each horizontal valley member has an open to permit molten material to cascade down the stack; ~~In special embodiments for high viscosity rock minerals a stack of horizontal valley members inside of said apparatus is used.~~

(e) a glass collector member for receiving the molten material from the stack; ~~a collector - glass body receiver member of said apparatus designed for glass body homogenization and the averaging of chemical composition and viscosity;~~

(f) two forehearths for receiving the molten material from the collector member;

~~a feeder member comprised of two sleeve members which is designed to provide glass body distribution to the periphery bushings located beneath the sleeves;~~

(g) a raised throat which retains higher-density glass component in the collector member and permits the passage of lower-density glass components; and

~~a step member is located between of each said sleeve and said collector. Wherein each step has an adjustable height to prevent the entrance of a high-specific gravity glass body components from collector to the bushings;~~

(k) two-chamber ~~multi-sectional~~ ceramic - composite bushings in each of the fore hearths, wherein each bushing comprises at least two ceramic plates with orifices; wherein the valley members have various heights to promote mixing and degassing and wherein each bushing further comprises water-cooled fins comprising TiNi intermetallic

walls, wherein the TiNi ia water vapor permeable. ~~member designed for glass body additional heat treatment, viscosity adjustment and fiber formation which is drawn /attenuated beneath the discharge wall which is comprised several orificed ceramic plates;~~

~~(l) a water cooled fin shield conduit member associated with discharge wall of a bushing comprising a wall made from refractory TiNi intermetallic. Wherein TiNi is a water vapor permeable material allowing the fiber manufacturing at suitable moisture environment.~~

~~2.~~ The multifunctional apparatus of claim 1, wherein first and second melting chambers ~~said chamber two retort members~~ are able to rotate when the rock mineral is loaded and melted and wherein each chamber comprises ~~retort is comprised of~~ two ~~different~~ cone shape shield members having different size: the bigger one is housing a cone shield made of refractory metallic material and the smaller a ceramic cone (tipped melting chamber where the melting of rock minerals is proceeded) is made from a thermal shock resistant, high- dimension stability refractory ceramic material. Wherein said ceramic ~~tipped~~ melting chamber is an extension of the metallic cone shield that is engaged into the metallic cone shield in such a way that it can be removed and replaced. ~~when damaged during operation because it operates in harsh conditions which are more severe than those affecting the housing metallic cone shield.~~

3. The multifunctional apparatus of claim 1, wherein said ~~two fore-~~ chambers ~~or two retorts~~ comprising natural gas containing oxygen burners and electric heating members are designed to melt ~~ground~~ rock material. ~~minerals.~~

4. The multifunctional apparatus of claim 1, wherein said sloped valley having an adjustable angle is positioned above said collector, wherein said sloped valley comprises a passageway with zones having different depths to provide glass body turbulent during flowing that causes an efficient mixing and volatile elements degasing.

~~5.~~ The multifunctional apparatus of claim 1, wherein ~~when the high-viscosity and heterogeneous rock minerals are used~~ a stack of horizontal valleys is positioned lower said sloped valley and above the collector. Wherein a stack of horizontal valley members is positioned inside of vertical furnace ~~of apparatus~~ one beneath the other designed to cause a glass body turbulence as it flows toward the collector, wherein quantity of said horizontal valleys is varied depending on the glass body viscosity. ~~Wherein the greater the viscosity the greater the number of horizontal valleys.~~

6. The multifunctional apparatus of claim 1, wherein a valve member is located beneath the collector to provide a periodical removal of the high-specific density ~~gravity~~ glass body components which drain off as they tend to accumulate at the bottom of collector.

7. The multifunctional apparatus of claim 1, wherein a collector - glass body receiver is located at the bottom of vertical apparatus, wherein said collector is designed for glass body homogenization and averaging of both the chemical composition and a viscosity.

8. The multifunctional apparatus of claim 1, wherein said ~~a two-chamber~~ ceramic-composite bushing member ~~of apparatus~~ comprises ~~of~~ the upper and the lower chamber members, wherein the lower chamber is abutted to the bottom of the upper chamber.

9. The multifunctional apparatus of claim 8, wherein said ~~two-chamber~~ bushing member made of ~~refractory~~, thermal shock resistant and a high-dimension stability inert ceramic material. Wherein the bottom of said upper chamber is referred to as an intermediate platform containing ~~holes/~~ openings through which the glass body flows to the lower chamber. Wherein the ~~holes/~~opening of the intermediate platform are designed the reduction of a hydrostatic pressure inside of the lower chamber.

10. The multifunctional apparatus of claim 8, wherein said ~~two-chamber~~ ceramic – composite bushing is located beneath of the collector (it is a central bushing) and the other periphery bushings are located beneath of the forehearths sleeves, wherein two or three said bushing members ~~of apparatus~~ are located beneath the each said fore hearth ~~sleeve~~ member.

11. The multifunctional apparatus of claim 8, wherein said ~~two-chamber~~ ceramic-composite bushing member comprises a vertically extended external thermal insulating layer positioned around of a bushing, wherein the insulating layer is thick enough to avoid a temperature gradient nearby of the walls of both the upper and the lower chambers.

12. The multifunctional apparatus of claim 8 wherein said two-chamber ceramic – composite bushing member is mounted to and located beneath the collector and the forehearth ~~sleeve~~ member by means of a supporting frame member which is comprised of several traverses made of a refractory, high-flexural strength metallic material.

13. The multifunctional apparatus of claim 1, wherein a vertical shaft member is located at the center inside of furnace and extended from the top to the bottom of the furnace of apparatus. Wherein central vertical shaft is designed to support the stack of internal horizontal valleys positioned inside of furnace.

~~14.~~ The multifunctional apparatus of claim (1), wherein said furnace ~~member~~ , depending on the mineral (basalt) rock chemical content and viscosity properties, can be modified to ~~the vertically or~~ horizontally extended member when the low-viscosity rock ~~mineral~~ basalts are used. ~~wherein said vertically extended apparatus comprises either two retorts or two fore-chambers positioned at the top of the furnace opposite each other.~~

15. The multifunctional apparatus of claim 1, comprising two forehearths ~~sleeves~~ associated with feeder –distributor of glass body to the bushings. Wherein each forehearth ~~sleeve~~ is connected to the collector through a step. Wherein the height of step between the collector and each sleeve is designed to prevent the entrance of high- specific density ~~gravity~~ components to the periphery bushings.

16. The multifunctional apparatus of claim 1, wherein said chambers to melt rocks ~~both fore-chamber /retort and metal~~ and ceramic bushing members can be ~~easily~~ removed and ~~changed when they are damaged during apparatus operation. For example retort which comprise two cone shields, including ceramic melting tipped chamber (associated with retort which operates at the extremely harsh condition) can be easily removed and~~ replaced without interruption of apparatus operation, wherein ~~Similarly~~ the lower chamber of ceramic bushing comprising ~~multi-sectional discharge wall containing plurality orificed~~ ceramic plates with orifices ~~of ceramic bushing members~~ can be removed ~~repaired~~ and replaced ~~and used again~~. ~~This operation is provided~~ when the housing upper chamber of a bushing still remains in place.

17. The multifunctional apparatus of claim 1, wherein said sloped valley member can be used in without ~~combination with~~ stack of horizontal valleys. ~~when a high-melting point component basalt rock minerals and a high viscosity glass body are used,~~ Wherein the angle of said slopped valley and the quantity of horizontal valleys in stack is varied depend on properties of rock material and they are adapted to prepare homogenious glass body suitable to manufacture amorphous fiber by size (diameter) from 7 to 20 microns, wherein said amorphous basalt fibers are manufactured from basalt rocks with variety of petrology, morphology properties such as (but not limited) gabbro, olivine, andesite, high-moduli acidic and Al- rich basalts including (but not limited) Northern Wisconsin Lake Superior basalt rock depositions.